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# Sensitivity Analysis in the Context of Quality Assurance

Jerome R. Ravetz*

*Institute for Science, Innovation and Society, University of Oxford, 111 Victoria Road, Oxford OX2 7QG, UK*

**Abstract**

Sensitivity analysis is a means of quality control of models. But its use is to be understood in the context of multi-level systemic quality assurance. This is simplest for classic science results, more demanding for sophisticated fields, and most difficult of all for scientific tools. Awareness of the ISO and the Quality movement, recognised in many other fields, would help in this case.

KEYWORDS Sensitivity Analysis, Tools, Quality Assurance

## 1. Main text

The problems of Sensitivity Analysis of Model Output are to be understood in a more general context. At the first level we have Quality Control of research productions; this is the classic peer-review system for journals. That is embedded in the broader process of Quality Assurance, which is one recursive level up. This includes: review of decisions, choice of referees, appeals to external stakeholders, and ultimately intervention by external actors. These two social functions are made problematic when the science under review becomes sophisticated, and less capable of scrutiny in its workings or evaluated for its truth-content.

When we move to a consideration of Tools, all these problems are intensified. While a scientific result can in principle be tested, as it contains assertions about the external world, a tool is not capable of such straightforward testing. It can only be evaluated through its effectiveness in improving the quality of the fields it serves. Such evaluations are necessarily indirect, and therefore not easily evaluated themselves. The consequence is that once established, tools are very difficult to dislodge. The case of the statistical significance test introduced by R.A. Fisher has been thoroughly examined; it is a good example of a generalised pathology in the use of tools (Ziliak & McCloskey 2008).

* Corresponding author. Tel.: +44+1865-512247

*E-mail address*: Jerome-ravetz@ntlworld.com


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Models of all sorts are problematic; we have a reliable history of a spectacularly bad use of models, in the mathematics of the Credit Crunch. Focusing on Sensitivity Analysis, we can say that while in principle it is a very powerful method of quality control on models, in the context of systemic quality assurance, it is vulnerable to every sort of defect in its understanding and use.

The moral of the story is that scientific tools, and hence the scientific tools of quality control, are not sufficient in themselves to perform their function. We can learn from the International Organization for Standardization, or ISO, and from the Quality Assurance movement, how to combine the technical and the social aspects of quality assurance in the use of scientific tools.

## 2. References

S.T. Ziliak and D.N. McCloskey, 2008: *The Cult of Statistical Significance*, University of Michigan